TETRAPLOIDY AND ALKALOID CONTENT IN *DATURA METEL* LINN.

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THE hypnotic effect following the ingestion of any part of the plant of any species of *Datura* has been known since ancient times and utilized in religious ceremonies both in America and in the Old World.

Of the ten recognised species of *Datura*, the only Asiatic species, *Datura metel* Linn. was the first and best known for its narcotic properties. It is the Dhustura of Sanskrit writers and the Hummatu of *Rheedess Hortus malabaricus* (1670). Several types of this species occur, these being either with simple or double, white or purple-coloured corolla and stems. The form with the simple white corolla is the *Datura alba* of Rhumpius (1737) and the one with double and coloured corolla has been given the status of a separate species, *Datura fastuosa* by Linnaeus himself in 1762 in the second edition of his species *Plantarum*. Hybrids between these varieties show marked heterosis (Balamani, 1963).

The immigrant American species *Datura innoxia* which grows as a weed in many parts of India is often mistaken for *Datura metel* even though its pubescent leaves and long spines on fruits are sufficiently notable to separate it from the glabrous-leaved and tuberculate fruits of *Datura metel*. In Nature all species of *Datura* are diploid, $2n=24$. The first tetraploid was reported by Belling in 1920 in *Datura stramonium*. Since then spontaneous tetraploids have been reported by Blakeslee and his co-workers in cultures of nearly all the species of *Datura* (1959). With the discovery of the use of colchicine as a means of inducing tetraploidy in plants, colchiploids of many economic and horticultural plants have been produced which are found to be better than diploids. In the case of medicinal plants colchiploidy has often resulted in increasing the chemical principles, and high-yielding varieties of *Mentha*, *Rauvolfia*, *Atropa* and *Hyoscyamus* are now available for cultivation (Rawson, 1944; Janaki Ammal, 1963).

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The genus *Datura* is today an important source of the alkaloids hyoscyamine, hyoscine and atropine in medicine.

With a view to improving the alkaloid content of *Datura metel*, tetraploidy was induced by the treatment of seeds collected from a single plant in Jammu. Seeds were treated with 0·4, 0·6, 0·8 and 1% of aqueous solution of colchicine for 48 hours. Treatment with 0·8% gave the best results, 31 out of 50 seedlings being tetraploid, $2n=48$. They had larger stomata and pollen grains as well as thicker and larger leaves and flowers than the diploids (Figs. 1-3), which are characteristic of colchiploids.

While the chemical analysis of the dry leaves of the diploid gave 0·1% to 0·2% total alkaloids, the alkaloid content of the tetraploids varied from 0·2% to 0·7%. The range of variation in the 31 tetraploid plants is given graphically in Fig. 4.

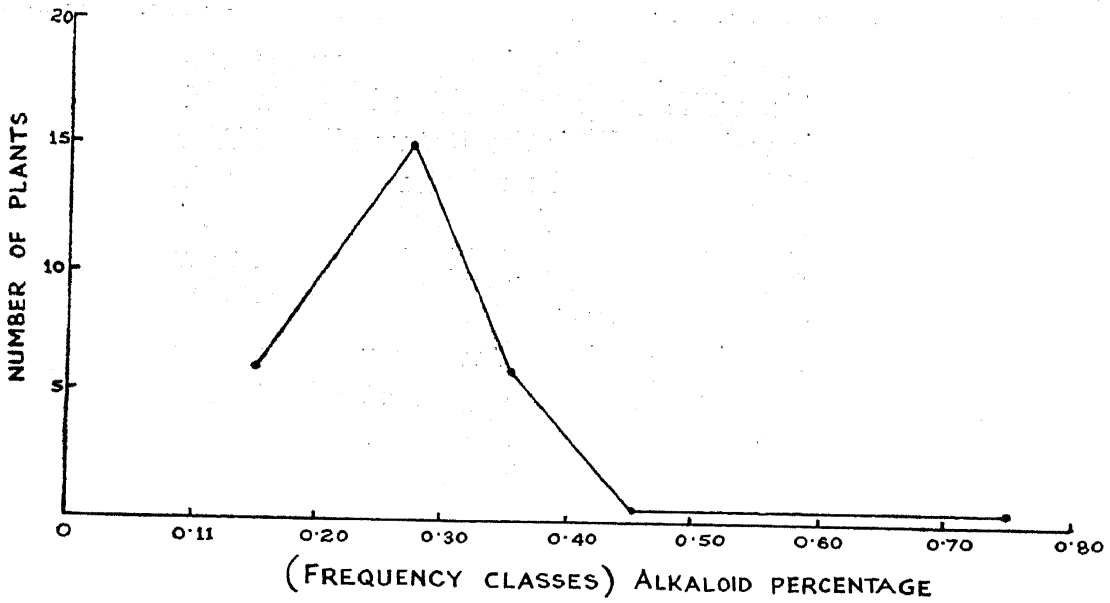

FIG. 4. Graph showing pattern of variation in population of tetraploid *Datura metel* Linn.

From the graph, it is evident that the tetraploid population is not uniform for alkaloid content. The morphological characters such as tubercles on fruit, flower and stem colour of the population are also showing variation. Thus, it appears the mother plant from which the seeds were collected is heterozygous. The range of variation of alkaloid content shown by the population indicates that possibly a number of genes are responsible for the production of alkaloids.

FIGS. 1–3. Fig. 1. A tetraploid plant of *Datura metel* Linn. Fig. 2. A diploid plant of *Datura metel* Linn. Fig. 3. Flowers of tetraploid and diploid *Datura metel* Linn.